

# Nanomanufacturing

Nanomanufacturing

	2004	2005	2006	2007	2008	2009
<b>Themes</b>	Developing the nanometrology infrastructure for nanomanufacturing					
<b>Principal Activities</b>	Improve imaging and metrology (SEM, AFM, optics) Extend nanofabrication (E-beam, atom-based, imprint, nanomachining) Facilitate control and assembly (high precision stages, optical tweezers)					
<b>Deliverables</b>	New metrology SEM Optical hardware and modeling for 65 nm node New Litho. STM Article on XSM Article on nano-force 2x2 MEMS-based positioning stage Nanodevice with nanowire SPM Oxidation mask Machining survey	Extended SEM modeling Improved etching Traceable AFM artifact 10 piconewton resolution instrument 6 degree of freedom fiber optic sensor Particle count standard 1&2D calibration structures Metrology Frame pub.	Validated SEM modeling Extension to 32 nm node Improved tips Stitching technique 10 piconewton resolution instrument 6 degree of freedom fiber optic sensor Particle count standard Sub-50 nmstructure via imprint Micro/nano imprint pub.	Reference SEM Scatterfield microscope Evaluated nanotube tip Techniques Comparison OT Instrument with 3D visualization Standard template Nano-machined nanoimprint mask	3 nm test features AFM Meas. Service Intrinsic force standards	Calibration services, standards
<b>Impacts</b>	New measurement capabilities	Standards, reference materials	Improved equipment performance measures	Improved modeling	Improved SPM lithography	Calibration services, standards